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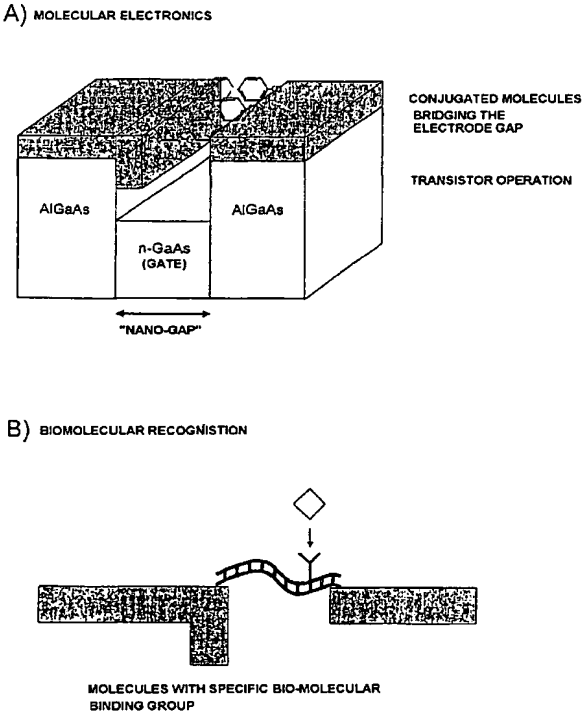
(54) Title: SEMICONDUCTOR BASE STRUCTURE FOR MOLECULAR ELECTRONICS AND MOLECULAR ELECTRONIC-BASED BIOSENSOR DEVICES AND A METHOD FOR PRODUCING SUCH A SEMICONDUCTOR BASE STRUCTURE



(57) Abstract: The invention concerns a structured semiconductor surface as basis for molecular electronics or molecular electronics-based bio-sensors. The starting point is a heterostructure consisting of two undoped layers of a semiconductor material that are separated by an extremely thin (a few nm) layer of a different semiconductor material. This material stack is cleaved perpendicular to the layer planes and the middle layer is selectively etched. Source- and drain contacts for conductive organic "wires" are by built by evaporation with a thin metal film. The middle conductive layer can be employed as electrostatic gate. An assembly for contacting a few up to single wires can be obtained by two sequential separations and evaporations. Possible organic wires are e.g. molecules with conjugated Œ-electron system, DNA-oligonucleotides or carbon nanotubes. By means of a further functionalisation with receptors for biomolecular recognition (antibodies, proteins) an employment as highly sensitive biosensor for detection, analysis and quantification of special biomolecules and their mutual interaction becomes possible (e.g. DNA-protein interaction).

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